



Test Report No. : 4790323504A-JP-R1-V0

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Issued date : 2022/3/25

RADIO TEST REPORT

Product : ALPHA Wireless Gaming Mouse

Model Name : ALPHAWL-BKCWW

Test Regulation : Article 2 paragraph 1 item 19, MIC notice 88 Appendix 43
ARIB STD-T66

Received Date : 2022/2/24

Test Date : 2022/3/4 ~ 2022/3/7

Issued Date : 2022/3/25

Applicant : ADATA Technology Co., Ltd.
2F., No.258, Lian Cheng Rd., Chung Ho Dist., New Taipei
City 235, Taiwan (R.O.C.)

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan

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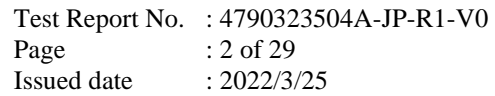
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Doc No: 17-EM-F0967 / 3.0



Original Test Report No.: 4790323504A-JP-R1-V0

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1. Attestation of Test Results

APPLICANT: ADATA Technology Co., Ltd.
2F., No.258, Lian Cheng Rd., Chung Ho Dist., New Taipei City 235,
Taiwan (R.O.C.)

EUT DESCRIPTION: ALPHA Wireless Gaming Mouse

BRAND: XPG

MODEL: ALPHAWL-BKCWW

SAMPLE STAGE: Engineering Verification Test sample

DATE of TESTED: 2022/3/4 ~ 2022/3/7

APPLICABLE STANDARDS	
STANDARD	Test Results
Article 2 paragraph 1 item 19, MIC notice 88 Appendix 43	PASS
ARIB STD-T66	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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Date : 2022/3/25

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2. Summary of Test Results

Summary of Test Results		
Test Items	MIC Notice	Test Result
Frequency Tolerance	MIC Notice No. 88 Appendix No. 43	PASS
Occupied Bandwidth (99% channel power bandwidth)		PASS
Spreading Bandwidth (90% channel power bandwidth)		PASS
Spurious Emission Transmitter		PASS
Antenna Power		PASS
Spurious Emission Receiver		PASS
Interference Prevention Function		PASS



3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with Article 2 paragraph 1 item 19, MIC notice 88 Appendix 43.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.



5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Parameter	Uncertainty
Occupied Bandwidth	± 0.12 %
Spurious emissions	± 1.9 dB
Output power density	± 2.0 dB
Out of band radiated power	± 1.9 dB
Frequency Tolerance	± 0.12 %



6. General Information

6.1. General Description of EUT

Product	ALPHA Wireless Gaming Mouse
Brand	XPG
Model Name	ALPHAWL-BKCWW
Sample ID	Conducted Test: 4707996 Radiated Test: 4707995
Radio Technology	SRD
Operating Frequency	2403MHz ~ 2475MHz
Modulation	GFSK
Transfer Rate	Up to 2 Mbps
Nominal Voltage	5Vdc from USB 3.7Vdc from Battery
Number of Channel	5
Rated RF Output Power Density	Refer to Note
Conducted RF Output Power Density	Refer to Note
Radiated RF Output Power Density	Refer to Note
Antenna Specification	Refer to item 6.4



Note:

1. The EUT contains following accessory devices:

Product	Brand	Model	Description
USB Cable	PENGJI	41-200-0538-100S	Length: 1.8m

2. The power table as below:

	Total Conducted RF Output Power Density (mW)	Rated Power (mW)	Radiated RF Output Power Density (mW)
SRD			
SRD	1.23	1.23	1.12

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

4. Test Environment:

Measurement temperature : 22 °C ~ 25 °C

Measurement humidity : 67.7% ~ 69%

5. Test Personnel: WaterNil Guan.



6.2. Description of test mode

Channel	Frequency (MHz)
1	2403
2	2423
3	2440
4	2461
5	2475

NOTE 1: By means of test software provided by manufacture, the power levels during the tests were set according to the following codes:

Channel	Power Setting
1	2
3	2
5	2



6.3. Test Condition

Test Conditions	Voltage (Vdc)
V_normal	3.7

Note: Since the input voltage to receiver RF circuit varies below $\pm 1\%$ when the input voltage from the external power supply to the receiver varies $\pm 10\%$, therefore only execute normal condition test.



6.4. Description of Available Antennas

6.4.1. Antenna Specification

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	WoodStone	2.4GHZ ANTENNA	PCB	-0.42

The above information was provided from customer and for more detailed features description, please refer to the customer's specifications.

6.4.2. Antenna Pattern

Please refer to the manufacturer's antenna report.



7. Test Instruments

Description	Manufacturer	Model No.	Serial No.	Calibration Authority	Cal. Method	Cal. Date	Expired date
Spectrum Analyzer	Rohde & Schwarz	FSV40	101490	Electronics Testing Center	c)	2021/9/7	2022/9/6
Power meter	Anritsu	MA2411B	1531202	Electronics Testing Center	c)	2021/12/22	2022/12/21
Power sensor	Anritsu	ML2495A	1645002	Electronics Testing Center	c)	2021/12/22	2022/12/21
Signal Generator	Keysight	N5182B	MY56200244	Electronics Testing Center	c)	2022/1/14	2023/1/13

Note: Calibration Method

- a) : Calibration conducted by the National Institute of Information and Communications Technology ~ NICT ~ or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.
- b) : Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) ~ Japan Calibration Service System ~.
- c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1) ~ TELEC Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc ~.
- d) : Calibration conducted by using other equipment that listed above from a) to c).



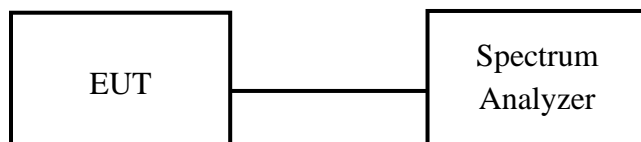
8. Test Results

8.1. Frequency Tolerance

8.1.1 Requirements

The limitation of Frequency Tolerance is less than or equal to $\pm 50\text{ppm}$.

8.1.2 Test Setup





8.1.3 Test Results

Mode	Voltage (Vdc)	Freq. (MHz)	Carrier Frequency (MHz)	Frequency Tolerance (ppm)	Limits (ppm)
SRD	Normal	2403	2402.9965	-1.4565	+/- 50ppm
		2440	2439.9952	-1.9672	+/- 50ppm
		2475	2474.9961	-1.5758	+/- 50ppm

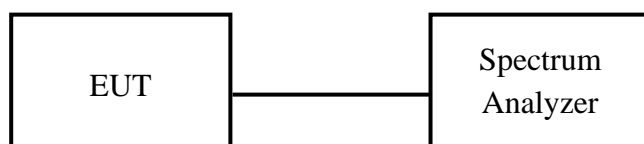


8.2. Occupied Bandwidth (99% Channel Power Bandwidth)

8.2.1 Requirements

Item	Limits
Occupied Bandwidth	FH, FH+DS, FH+OFDM: $\leq 83.5\text{MHz}$ Others: $\leq 26\text{MHz}$ OFDM1: $\leq 26\text{MHz}$ OFDM2: $26\text{MHz} < \text{BW} \leq 38\text{MHz}$

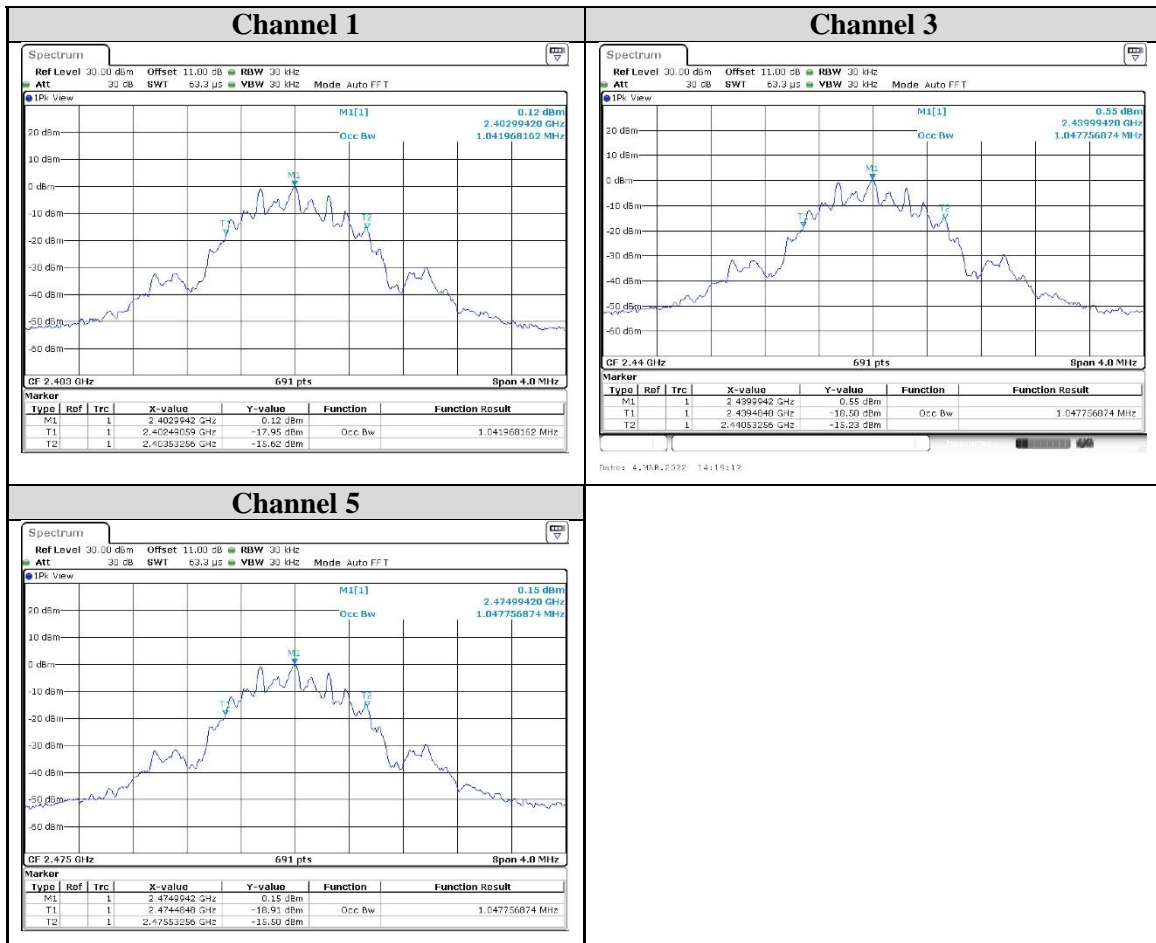
8.2.2 Test Setup





8.2.3 Test Results

Mode	Voltage	Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Pass/Fail
SRD	Vnormal	2403	1.0420	≤ 26	PASS
		2440	1.0478	≤ 26	PASS
		2475	1.0478	≤ 26	PASS



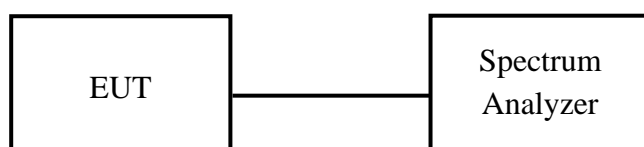


8.3. Spreading Bandwidth (90% Channel Power Bandwidth)

8.3.1 Requirements

Item	Limit	Remark
Spreading Bandwidth	≥ 500 kHz	(For DSSS, FHSS)
Spreading Factor	≥ 5	Operating frequency 2400 to 2483.5 MHz

8.3.2 Test Setup



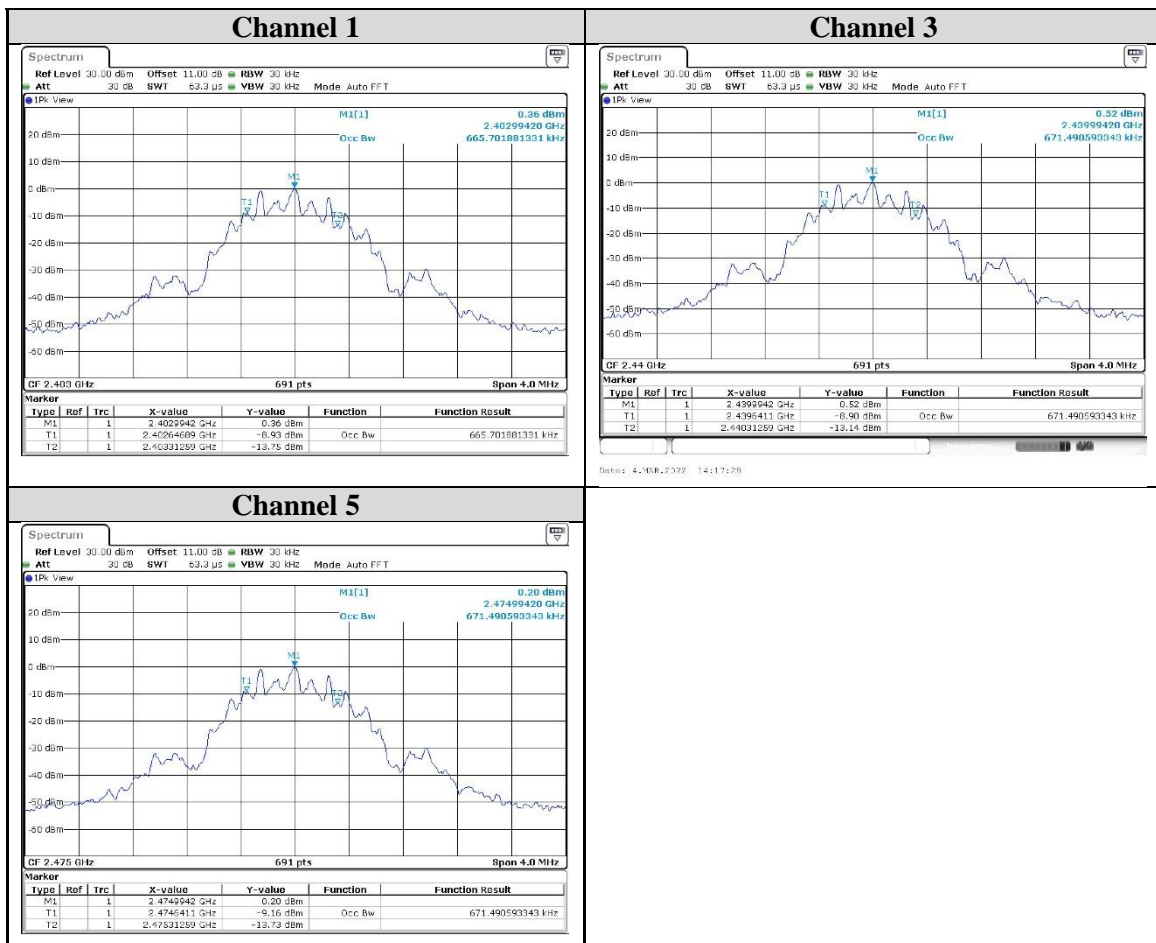


8.3.3 Test Results

Mode	Voltage	Frequency (MHz)	Occupied Bandwidth (MHz)	Spreading Factor	Limit	Pass/Fail
SRD	Vnormal	2403	0.6657	10.65	≥ 5	PASS
		2440	0.6715	10.74	≥ 5	PASS
		2475	0.6715	10.74	≥ 5	PASS

Note: 1. For the test plots please refer to the below pages.

2. Spreading Factor: 90 % channel power bandwidth / 0.0625.



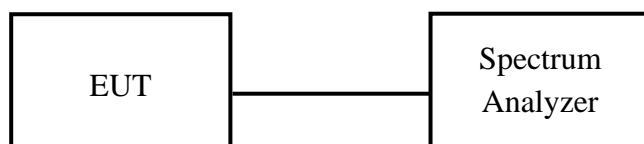


8.4. Spurious Emissions for Transmitter

8.4.1 Requirements

Frequencies(MHz)	Limits
30MHz-1GHz	$\leq 0.25 \mu\text{W}/100\text{kHz}$
1GHz-2.387GHz	$\leq 2.5 \mu\text{W}/\text{MHz}$
2.387GHz-2.4GHz	$\leq 25 \mu\text{W}/\text{MHz}$
2.4835GHz-2.4965GHz	$\leq 25 \mu\text{W}/\text{MHz}$
2.4965GHz -13GHz	$\leq 2.5 \mu\text{W}/\text{MHz}$

8.4.2 Test Setup





8.4.3 Test Results

Normal Voltage

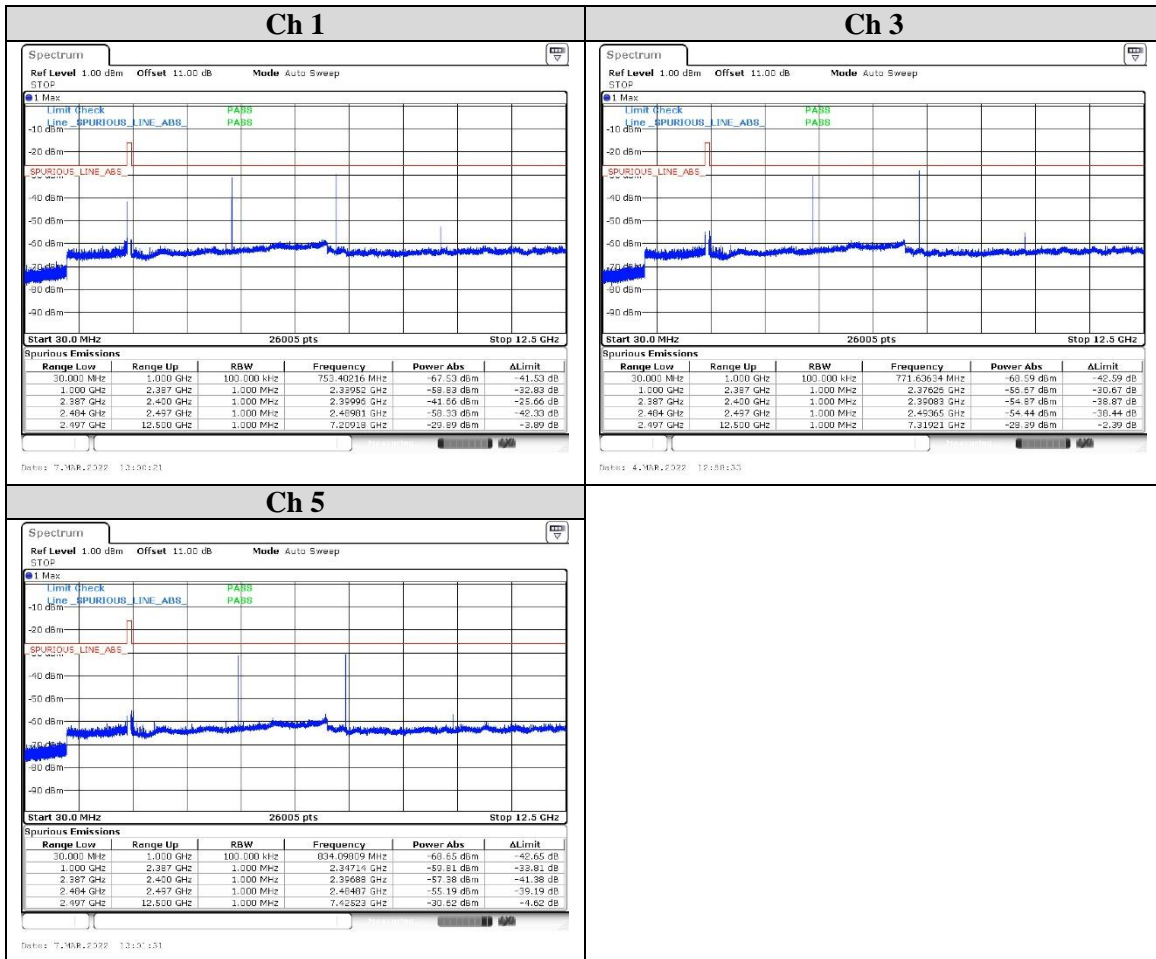
Test Ch.	Tested Freq. Range (MHz)	Test Result		Limit per Chain (μW)	Worst (μW)	Limit (μW)	Result
		Freq. (MHz)	Value (μW)				
1	30.0 to 1000.0	753.402	0.000177	0.25	0.000177	0.25	PASS
	1000.0 to 2387.0	2339.519	0.001309	2.5	0.001309	2.5	PASS
	2387.0 to 2400.0	2399.958	0.068234	25	0.068234	25	PASS
	2483.5 to 2496.5	2489.812	0.001469	25	0.001469	25	PASS
	2496.5 to 12500.0	7209.178	1.025652	2.5	1.025652	2.5	PASS
3	30.0 to 1000.0	771.636	0.000138	0.25	0.000138	0.25	PASS
	1000.0 to 2387.0	2376.256	0.002153	2.5	0.002153	2.5	PASS
	2387.0 to 2400.0	2390.830	0.003258	25	0.003258	25	PASS
	2483.5 to 2496.5	2493.651	0.003597	25	0.003597	25	PASS
	2496.5 to 12500.0	7319.205	1.448772	2.5	1.448772	2.5	PASS
5	30.0 to 1000.0	834.098	0.000136	0.25	0.000136	0.25	PASS
	1000.0 to 2387.0	2347.144	0.001045	2.5	0.001045	2.5	PASS
	2387.0 to 2400.0	2396.885	0.001828	25	0.001828	25	PASS
	2483.5 to 2496.5	2484.874	0.003027	25	0.003027	25	PASS
	2496.5 to 12500.0	7425.232	0.866962	2.5	0.866962	2.5	PASS



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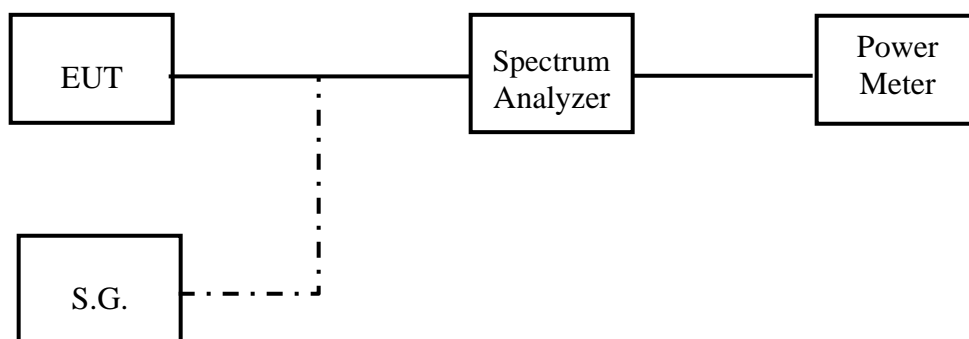


8.5. Antenna Power

8.5.1 Requirements

Item	Limits
Antenna Power Density	$\leq 3 \text{ mW/MHz}$ (2427~2470.75MHz)
	DS: $\leq 10 \text{ mW/MHz}$
	OFDM: $\leq 10 \text{ mW/MHz}$ (Bandwidth $\leq 26\text{MHz}$)
	OFDM: $\leq 5 \text{ mW/MHz}$ ($26\text{MHz} < \text{Bandwidth} \leq 38\text{MHz}$)
	Others: $\leq 10 \text{ mW}$

8.5.2 Test Setup





8.5.3 Test Results

Normal Voltage

Channel	Antenna Power (mW)	Antenna Power Limit (mW)	Rated Power (mW)	Antenna Power Tolerance (%)	Tolerance Range Limit (%)	Antenna Gain (dBi)	EIRP Antenna Power (mW)	EIRP Antenna Power Limit (mW)
1	1.17	10.00	1.23	-4.88	+20% ~ -80%	-0.42	1.06	16.37
3	1.23	10.00	1.23	0.00	+20% ~ -80%	-0.42	1.12	16.37
5	1.21	10.00	1.23	-1.63	+20% ~ -80%	-0.42	1.10	16.37

Note:

1. Antenna Power Tolerance (%) = {(Conducted Antenna Power – Rated power)/Rated power*100}.
2. EIRP Antenna Power = Conducted Antenna Power + Antenna gain.

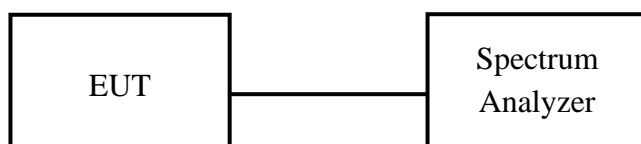


8.6. Spurious Emissions for Receiver

8.6.1 Requirements

Frequencies (MHz)	Limit
Below 1 GHz	≤ 4 nW (-54 dBm)
Above 1 GHz	≤ 20 nW (-47 dBm)

8.6.2 Test Setup

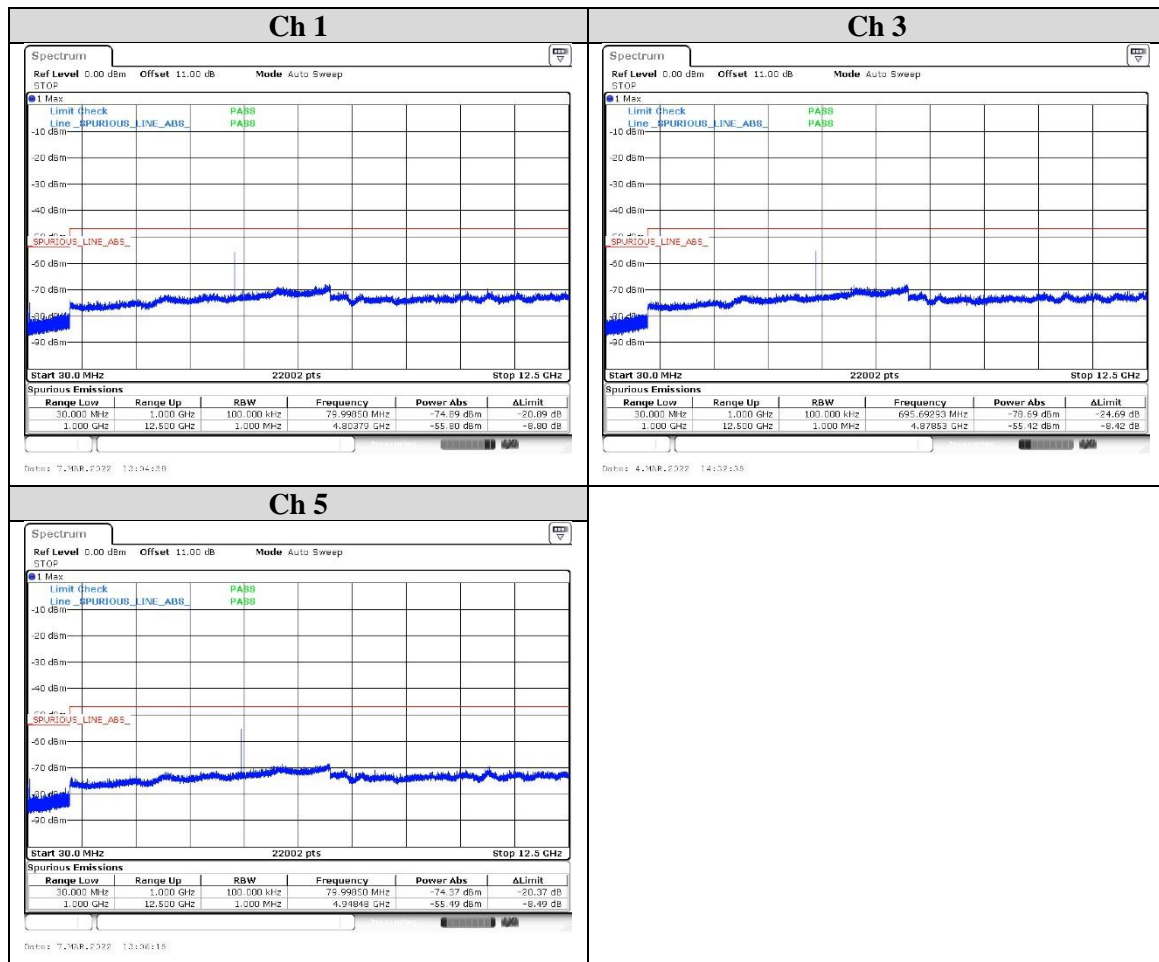




8.6.3 Test Results

Normal Voltage

Test Ch.	Tested Freq. Range (MHz)	Test Result		Per Chain Limit (nW)	Total Value (nW)	Total Limit (nW)	Result
		Freq. (MHz)	Value (nW)				
1	Below 1 GHz	79.999	0.032434	4	0.032434	4	PASS
	Above 1 GHz	4803.787	2.630268	20	2.630268	20	PASS
3	Below 1 GHz	695.693	0.013521	4	0.013521	4	PASS
	Above 1 GHz	4878.531	2.870781	20	2.870781	20	PASS
5	Below 1 GHz	79.999	0.036559	4	0.036559	4	PASS
	Above 1 GHz	4948.483	2.824880	20	2.82488	20	PASS



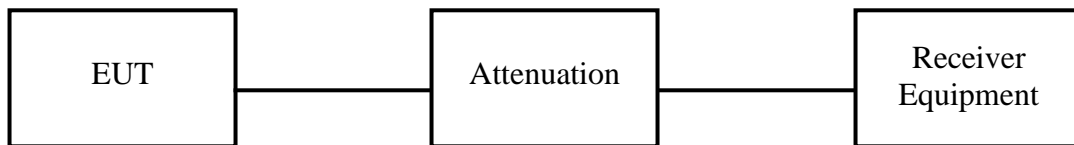


8.7. Interference Prevention Function

8.7.1 Requirements

Radio equipment used mainly on the same premises and automatically transmits or receives identification code.

8.7.2 Test Setup



8.7.3 Test Results

Link Mode	Test Result
SRD	PASS



9. Conducted Emission Measurement Setup Configurations



END OF REPORT

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